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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/691,080  | 10/22/2003  | Barry E. Burke       | MIT8431L            | 9280             |
| 7590  | 03/10/2005  |                      | EXAMINER            |                  |
| Theresa A. Lober<br>T.A. Lober Patent Services<br>45 Walden Street<br>Concord, MA 01742 |             |                      | LUU, CHUONG A       |                  |
|   |             |                      | ART UNIT            | PAPER NUMBER     |
|   |             |                      | 2818                |                  |

DATE MAILED: 03/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                 |              |
|------------------------------|-----------------|--------------|
| <b>Office Action Summary</b> | Application No. | Applicant(s) |
|                              | 10/691,080      | BURKE ET AL. |
|                              | Examiner        | Art Unit     |
|                              | Chuong A. Luu   | 2818         |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_.
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_ is/are allowed.
- 6) Claim(s) 1-15 and 18-20 is/are rejected.
- 7) Claim(s) 16 and 17 is/are objected to.
- 8) Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.

- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: \_\_\_\_.

## DETAILED ACTION

### PRIOR ART REJECTIONS

#### Statutory Basis

##### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

#### **The Rejections**

Claims 1-10, 12, 14-15 and 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Rhodes (U.S.4,742,016).

Rhodes discloses a method of manufacturing a two-phase CCD with

(1); (18); (19); (20) forming an electrically conducting charge transfer channel in a semiconductor substrate (20);

forming an electrically insulating layer on a surface of the substrate (22);

forming a layer of gate electrode material on the insulating layer (24);

forming on the gate material layer (24) a first patterned masking layer (26) having apertures that expose regions of the underlying gate material layer that are to form gate electrodes (see Figure 4);

electrically doping the first-pattern-exposed regions of the gate material layer (24) (see column 4, lines 20-35);

forming on the gate material layer a second patterned masking layer having apertures that expose regions of the underlying gate material layer that are to form gaps between gate electrodes (see column 4, lines 40-57);

etching the second-pattern-exposed regions of the gate material layer (see Figure 6);

**(2)** further comprising removal of the first patterned masking layer after electrically doping first-pattern-exposed regions of the gate material layer (see column 4, lines 20-35);

**(3)** further comprising removal of the second patterned masking layer after etching second-pattern-exposed regions of the gate material layer (see column 4, lines 40-57);

**(4)** wherein the first-pattern-exposed regions of the gate material layer are electrically doped before the second-pattern-exposed regions of the gate material layer are etched (see column 4, lines 20-35);

**(5)** wherein electrically doping first-pattern-exposed regions of the gate material layer comprises ion implantation of a selected electrical dopant into the first-pattern-exposed regions of the gate material layer (see column 4, lines 20-35);

**(6)** wherein etching the second-pattern-exposed regions of the gate material layer comprises plasma etching the second-pattern-exposed regions of the gate material layer (see column 4, lines 40-57);

(7) further comprising heat treating the electrically-doped and etched gate electrode material layer to diffuse the electrical dopant through the gate material layer thickness (see column 5, lines 4-27);

(8) wherein heat treating the electrically-doped and etched gate electrode material layer comprises annealing the gate material layer (see column 5, lines 4-27);

(9) wherein heat treating the electrically-doped and etched gate electrode material layer comprises oxidation of the gate material layer (see column 5, lines 4-27);

(10) wherein forming a first patterned masking layer and forming a second patterned masking layer each comprise forming a masking layer having a pattern the apertures of which are characterized by an extent accounting for lateral dopant diffusion during the heat treatment (see column 4, lines 20-57 and column 5, lines 4-27);

(12) wherein forming an electrically insulating layer on a surface of the substrate comprises forming a layer of oxide on the substrate surface (see column 4, lines 20-57);

(14) wherein forming a layer of gate electrode material on the insulating layer comprises depositing a layer of polysilicon on the insulating layer (see column 4, lines 7-10);

(15) wherein forming a first patterned masking layer and forming a second patterned masking layer each comprise forming a layer of photoresist that is photolithographically patterned (see column 4, lines 20-57).

#### **PRIOR ART REJECTIONS**

#### **Statutory Basis**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**The Rejections**

Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rhodes (U.S.4,742,016) in view of Erhardt (U.S. 5,114,833).

Rhodes discloses the claimed invention except for wherein forming an electrically conducting charge transfer channel in a semiconductor substrate comprises ion implantation of a selected electrical dopant into a silicon substrate, the selected electrical dopant being of a conductivity type opposite that of the silicon substrate; wherein forming a layer of gate electrode material on the insulating layer comprises depositing a layer of amorphous silicon on the insulating layer. However, Erhardt discloses a charge-coupled-device with (11) wherein forming an electrically conducting charge transfer channel in a semiconductor substrate comprises ion implantation of a selected electrical dopant into a silicon substrate, the selected electrical dopant being of a conductivity type opposite that of the silicon substrate (see column 2, lines 36-58. Figures 5-9); (13) wherein forming a layer of gate electrode material on the insulating layer comprises depositing a layer of amorphous silicon on the insulating layer; It would have been obvious to one having ordinary skill in the art at the time the invention was

made to modify the teaching of Rhodes (accordance with the teaching of Erhardt), since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

***Allowable Subject Matter***

Claims 16-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chuong A. Luu whose telephone number is (571) 272-1902. The examiner can normally be reached on M-F (6:15-2:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CAL  
March 4, 2005



David Neims  
Supervisory Patent Examiner  
Technology Center 2800